TRAFFIC RECORDS PROGRAM ASSESSMENT ADVISORY

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INTRODUCTION

Each state, in cooperation with its local and regional jurisdictions, should implement a traffic records system (TRS) to support highway and traffic safety decision-making and long-range transportation planning. A complete TRS is necessary for identifying the locations and causes of crashes, planning, operational management, and control, and evaluating highway safety programs and improvements. Decisions based on accurate and timely data are basic to the implementation of all highway safety countermeasures and are a key ingredient to effective and efficient safety management.

Scope of This Advisory

The Traffic Records Program Assessment Advisory deals specifically with the information used for highway and traffic safety decision making within a state. This includes data about crashes on all public roadways, the people and vehicles involved, traffic volumes, roadway characteristics, environment, and the licensing of drivers and vehicles operating in a state.

This assessment advisory, then, must address these aspects of a TRS:

- its role in collecting, storing, and providing reliable, accurate and timely data on all contributing factors and circumstances in crashes
- its role in meeting the needs of decision makers in highway and traffic safety while still meeting the operational needs of the custodians of the major components of the system
- the coordination, management, and planning of an automated system that meets these needs

Purpose of This Advisory

The purpose of this assessment advisory is to provide states with guidance on the necessary contents, capabilities, and quality of data in a TRS. This assessment advisory serves as a description of an ideal system – one that supports high-quality decisions that lead to cost-effective improvements in highway and traffic safety.

Definition of a Traffic Records System

As stated in the 2006 *National Agenda for the Improvement of Highway Safety Information Systems*, a product of the National Safety Council's Traffic Records Committee (now ATSIP, the Association of Transportation Safety Information Professionals):

> "Highway safety information systems provide the information which is critical to the development of policies and programs that maintain the safety and the operation of the nation's roadway transportation network."

A TRS has been defined as a virtual set of independent real systems (e.g., driver conviction records, crash records, roadway data, etc.), which collectively form the information base for the management of the highway and traffic safety activities of a state and its local subdivisions. A more modern concept of a TRS encourages states to take a global approach and work toward compiling data into a unified, accessible resource that meets the needs for safety information. Sharing and integrating data makes such a system possible, without necessarily duplicating costly and time-consuming tasks such as data entry. Achieving integrated access to data without bringing all the data into a single database is a goal of the TRS. In actual practice, states may fall short of the ideal yet still have systems that meet most users' needs efficiently. A benefit of the integrated approach is that the agencies responsible for the TRS will come to view it as a real system, not simply the combination of separate systems that otherwise do not interact.

Traffic Records Data and the Strategic Highway Safety Plan

The Federal Highway Administration's (FHWA) preliminary guideline published in October 2005, *Strategic Highway Safety Plans: A Champions' Guide to Saving Lives (Interim Guidance to Supplement SAFETEA-LU Requirements),* clearly states that data are critical in the development of an effective Strategic Highway Safety Plan (SHSP). The strength of the SHSP is in a state's ability to identify, analyze, prioritize, and evaluate reliable data. States must have a data system in place that supports safety problem identification and countermeasure analysis on all public roads. To accomplish this, states must ensure capabilities for traffic records data collection, analysis, and integration with other sources of safety data.

Furthermore, a state should strive to improve the timeliness, accuracy, completeness, uniformity, integration, and accessibility of the safety data needed to identify priorities for stakeholders. A state should not stop the SHSP development process to wait for better data systems. Planning should begin using the best data that are available. A traffic records assessment based on this advisory provides recommendations and suggestions for further improvement in these systems.

SECTION 1: TRAFFIC RECORDS SYSTEM MANAGEMENT

Management of a state TRS requires coordination and cooperation. The data that make up a TRS reside in a variety of operational systems that are created and maintained to meet primary needs in areas other than highway safety. Ownership of these databases usually resides with multiple agencies, and the collectors and users of the data span the entire state and beyond.

The development and management of traffic safety programs should be a systematic process with the goal of reducing the number and severity of traffic crashes. This data-driven process should ensure that all opportunities to improve highway safety are identified and considered for implementation. Furthermore, the effectiveness of highway safety programs should be evaluated. These evaluation results should be used to facilitate the implementation of the most effective highway safety strategies and programs. This process should be achieved through the following initiatives.

1-A: Traffic Records Coordinating Committee

The National Highway Traffic Safety Administration's (NHTSA) 2004 *Initiatives to Address Improving Traffic Safety Data* Integrated Project Team report (hereafter referred to as the *Data IPT Report*) includes guidance on establishing a successful Traffic Records Coordinating Committee (TRCC). The following include recommendations from the *Data IPT Report* and additional items of an advisory nature:

- ❑ Establish a two-tiered TRCC.
  There should be an executive and a working-level TRCC. The executive-level TRCC should be composed of agency directors who set the vision and mission for the working-level TRCC. The Executive TRCC should review and approve actions proposed by the Working TRCC. The Working TRCC should be composed of representatives for all stakeholders and have responsibilities, defined by the Executive TRCC, for oversight and coordination of the TRS. Together, the two tiers of the TRCC should be responsible for developing, maintaining, and tracking accomplishments related to the State's S*trategic Plan for Traffic Records Improvement*.

- ❑ Ensure Membership is Representative.
  TRCCs should be representative of all stakeholders, and each stakeholder representative must have support from their top management. When departments are considering changes to their systems, all TRCC members should be notified and departments should consider how to accommodate the needs of all the TRCC agencies.

- ❑ Authorize Members.
  The Working TRCC should have formal standing, recognition, and support of the administrators of participating agencies. This support will help the TRCC succeed in overcoming the institutional barriers, lack of focus, and lack of resources that prevent collaboration and progress in integrating highway safety data. The exact role and powers of the TRCC should be made explicit in its

charter. Legislators, the governor, and top management of participating agencies should give authority to the TRCC members to make policy decisions and commit their agencies' resources to solve problems and approve the state's strategic plan for traffic records. The most important responsibility of the TRCC should be to provide the leadership necessary to ensure that available funds are sufficient to match stated needs. Despite challenges stemming from collective decision making by members from different agencies with competing priorities, TRCC members should speak with "one voice." The TRCC should have guidelines to determine who speaks for the TRCC and how its recommendations should be communicated.

- ❑ Appoint an Administrator/Manager.
  A single point of contact for managing a data improvement project is necessary to ensure leadership. The TRCC should designate a traffic records administrator or manager and provide sufficient time and resources to do the job. This person should be responsible for coordinating and scheduling the TRCC, in addition to tracking the progress of implementing the state's traffic records strategic plan. Uniform criteria should be established for monitoring progress. NHTSA can facilitate training for the TRCC administrator/manager regarding traffic record systems, program management, and data analysis.

- ❑ Schedule Regular Meetings.
  The TRCC should establish a schedule of regular meetings, not only to discuss data coordination issues and make progress on the strategic plan, but also to share success stories to aid in overcoming fears of implementation. The meetings should take place as required to deal with the state's traffic records issues and to provide meaningful coordination among the stakeholders. The TRCC should gain broader support by marketing the benefits of improved highway safety data. An example to provide data and analytical expertise to local government officials, legislators, decision makers, community groups, and all other stakeholders. TRCC meetings should include strategy sessions for such marketing plans.

- ❑ Oversee Quality Control/Improvement.
  The TRCC should have oversight responsibility for quality control and quality improvement programs affecting all traffic records data. Regularly scheduled presentations of quality control metrics should be part of the TRCC meeting agenda and the TRCC should promote projects to address the data quality problems that are presented.

- ❑ Oversee Training for TRS Data Improvement.
  The TRCC should have oversight responsibility for encouraging and monitoring the success of training programs implemented specifically to improve TRS data quality. Regularly scheduled presentations of training needs and training participation should be part of the TRCC meeting agenda, and the TRCC should promote projects to conduct training needs assessments and address the identified training needs.

1-B: Strategic Planning

The TRS should operate in a fashion that supports the traffic safety planning process. The planning process should be driven by a strategic plan that helps state and local data owners identify and support their overall traffic safety program needs and addresses the changing needs for information over time. Detailed guidance for strategic planning is included in the *NHTSA Strategic Planning Guide* and the *FHWA Strategic Highway Safety Plan* documents. The strategic plan should address activities such as:

- ❑ Assign Responsibility for the Strategic Plan.
  The strategic plan should be created and approved under the direction of the TRCC. The TRCC should continuously monitor and update the plan, to address any deficiencies in its highway traffic records system.

- ❑ Ensure Continuous Planning.
  The application of new technology in all data operational phases (i.e., data collection, linkage, processing, retrieval, and analysis) should be continuously reviewed and assessed. The strategic plan should address the adoption and integration of new technology as this facilitates improving TRS components.

- ❑ Move to Sustainable Systems.
  The strategic plan should include consideration of the budget for lifecycle maintenance and self-sufficiency to ensure that the TRS continues to function even in the absence of grant funds.

- ❑ Meet Local Needs.
  The strategic plan should encourage the development of local and statewide data systems that are responsive to the needs of all stakeholders.

- ❑ Promote Data Sharing.
  The strategic plan should promote identification of data sharing opportunities and the integration among federal, state, and local data systems. This will help to eliminate duplication of data and data entry, assuring timely, accurate, and complete traffic safety information.

- ❑ Promote Data Linkage.
  Data should be integrated to provide linkage between components of the TRS. Examples of valuable linkages for highway and traffic safety decision making include crash data with roadway characteristics, location, and traffic counts; crash data with driver and vehicle data; and crash data with adjudication data, healthcare treatment and outcome data (e.g., Crash Outcome Data Evaluation System [CODES]).

- ❑ Coordinate with Federal Partners.
  The strategic plan's budget-related items should include coordination between the state and the various federal programs available to fund system improvements. The data collection, management, and analysis items in the

strategic plan should include coordination of the state's systems with various federal systems (e.g., the Fatality Analysis Reporting System [FARS], the Problem Driver Pointer System [PDPS] of the National Driver Registry [NDR], the Motor Carrier Management Information System [MCMIS], and the Commercial Driver License Information System [CDLIS]).

- ❑ Incorporate Uniform Data Standards.
  The strategic plan should include elements that recognize and schedule incorporation of uniform data elements, definitions, and design standards in accordance with national standards and guidelines. Current examples of these standards and guidelines include:
  - Model Minimum Uniform Crash Criteria (MMUCC)
  - American National Standards Institute (ANSI) -D20.1 and ANSI-D16.1
  - National Governors Association (NGA)
  - Global Justice XML Data Model (GJXDM)
  - National Center for State Courts, Technology Services, Traffic Court Case Management Systems Functional Requirement Standards
  - Guidelines for Impaired Driving Records Information Systems
  - National Emergency Medical Service Information System (NEMSIS) Data Dictionary.

- ❑ Plan to Meet Changing Requirements.
  To help the state meet future highway safety challenges, the strategic plan should include a periodic review of data needs at the local, state, and federal levels. It should be updated to include tasks to meet those needs as they are identified.

- ❑ Support Strategic Highway Safety Planning and Program Management.
  The strategic plan should include elements designed to ensure that the state captures program baseline, performance, and evaluation data in response to changing traffic safety program initiatives. Additional elements should be present for establishing and updating countermeasure activities (e.g., crash reduction factors used in project selection and evaluation).

- ❑ Strategic Planning of Training and Quality Control.
  The strategic plan should incorporate activities for identifying and addressing data quality problems, especially as these relate to training needs assessments and training implementation.

1-C: Data Integration

The *Data IPT Report* recommends that states integrate data and expand their linkage opportunities to track traffic safety events among data files. Integrated data should enable driver license and vehicle registration files to be updated with current violations, prevent the wrong driver from being licensed, or keep an unsafe vehicle from being registered. Integration should ensure that all administrative actions are available at the time of the driver's sentencing. Data linkage is an efficient strategy for expanding the data available, while avoiding the expense and delay of new data collection.

State TRCCs should develop working relationships with the health care community to ensure that the causation, crash, emergency medical services, hospital, and other injury-related data linked during the event can be merged statewide. They should also link to other data such as vehicle insurance, death certificates, medical examiner reports, etc., to support analysis of state-specific public health needs.

Linkage with location-based information such as roadway inventory databases and traffic volume databases at the state level can help identify the kinds of roadway features that experience problems, allowing states to better address these needs through their various maintenance and capital improvement programs. Data integration should be addressed through the following:

- ❑ Create and Maintain a Traffic Records System Inventory.
  The TRS documentation should show the data elements and their definitions and locations within the various component systems. Ancillary documentation should be available that gives details of the data collection methods, edit/error checking related to each data element, and any known problems or limitations with use of a particular data element. The system inventory should be maintained centrally, ideally in a data clearinghouse, and kept up-to-date through periodic reviews with the custodial agencies. Funding for system development and improvement should include a review of existing systems' contents and capabilities.

- ❑ Support Centralized Access to Linked Data.
  The traffic records user community should be able to access the major component data files of the TRS through a single portal. To support this access, the state should promote an enterprise architecture and database, and develop a traffic records clearinghouse to serve as the gateway for users. The databases in the clearinghouse should be linked in ways that support highway safety analysis. At a minimum, this would include linkage by location, involved persons, and events.

- ❑ Meet Federal Reporting Requirements.
  The TRS, where possible, should link to or provide electronic upload files to federal data systems such as FARS, MCMIS/SafetyNet, Highway Performance Monitoring System (HPMS), and others.

- ❑ Support Electronic Data Sharing.
  The TRS should support standard methods for transporting data between systems. At a minimum, these should include a documented file structure and data definitions for information to be transferred to statewide databases. Standard information transfer formats and protocols, such as XML format and FTP, should be supported.

- ❑ Adhere to State and Federal Privacy and Security Standards.
  The TRS should make linked data as accessible as possible while safeguarding private information in accordance with state and federal laws. This includes security of information transferred via the Internet or other means.

1-D: Data Uses and Program Management

Data availability and quality directly affect the effectiveness of informed decision making about sound research, programs, and policies. Accurate, comprehensive, and standardized data should be provided in a timely manner to allow the agency or decision-making entities at the state or local levels to:

- ❑ Conduct Problem Identification.
  Problem identification is the process of determining the locations and causes of crashes and their outcomes and of selecting those sites and issues that represent the best opportunity for highway safety improvements. States should be able to conduct problem identification activities with their traffic records system.

- ❑ Develop Countermeasure Programs and Program Management Procedures.
  States select and evaluate strategies for preventing crashes and improving crash outcomes. This requires that decision makers can select cost-effective countermeasures and that safety improvement programs and funds should be managed based on data-driven decision making.

- ❑ Perform Program Evaluation.
  States should be capable of measuring progress in reducing crash frequency and severity. Ideally, the effectiveness of individual programs and countermeasures should be evaluated and the results used to refine development and management processes.

- ❑ Support Safety-Related Policies and Planning.
  The states are responsible for developing SHSPs. These data should be available to support this and other policy and planning efforts such as development of agency-specific traffic safety policies, traffic records strategic planning, safety conscious planning, and others.

- ❑ Access Analytic Resources.
  Data users, and decision makers in particular, should have access to resources including skilled analytic personnel and easy to use software tools to support their needs. These tools should be specifically designed to meet needs such as addressing legislative issues (barriers as well as new initiatives), program and countermeasure development, management, and evaluation, as well as meeting all reporting requirements.

- ❑ Provide Public Access to Data.
  The TRS should be designed to give the public or general non-government user reasonable access to data files, analytic results, and resources, but still meet state and federal privacy and security standards.

- ❑ Promote Data Use and Improvement.
  The TRS should be viewed as more than just a collection of data repositories, and rather as a set of processes, methods, and component systems. Knowledge

of how these data should be collected and managed, along with where the bottlenecks and quality problems arise, is critical to users understanding proper ways to apply the data. This knowledge should also aid in identifying areas where improvement is possible.

SECTION 2: TRAFFIC RECORDS SYSTEM COMPONENTS

At the time of passage of the Highway Safety Act of 1966, state centralized TRS generally contained basic files on crashes, drivers, vehicles, and roadways. Some states added data on traffic safety-related education, either as a separate file or as a subset of the Driver File. As traffic safety programs matured, many states incorporated EMS and Citation/Conviction Files for use in safety programs. Additionally, some states and localities maintain a Safety Management File that consists of summary data from the central files that can be used for problem identification and safety planning.

As the capabilities of computer hardware and software systems increased and the availability of powerful systems has expanded to the local level, many states have adopted a more distributed model of data processing. For this reason, the model of a TRS needs to incorporate a view of information and information flow, as opposed to focusing only on the files in which that information resides.

Under this more distributed model, it does not matter whether data for a given system component are housed in a single database on a single computer or spread throughout the state on multiple local systems. What matters is whether the information is available to users, in a form they can use, and that these data are of sufficient quality to support its intended uses. Thus, it is important to look at information sources. These information sources have been grouped to form the major components of a TRS:

- ❑ Crash Information
- ❑ Roadway Information
- ❑ Driver Information
- ❑ Vehicle Information
- ❑ Citation/Adjudication Information
- ❑ Statewide Injury Surveillance Information

Together, these components provide information about places, property, and people involved in crashes and about the factors that may have contributed to the crash or traffic stop. The system should also contain information that may be used to judge the relative magnitude of problems identified through analysis of data in the TRS. This includes demographic data (social statistics about the general population such as geographic area of residence, age, gender, ethnicity, etc.) to account for differences in exposure (normalization) and data for benefit/cost and cost effectiveness determinations. Performance level data should be included to support countermeasure management.

A frequently used overview of the contents of a TRS is the Haddon Matrix, named after its developer, William Haddon, the first NHTSA Administrator. It provides a valuable framework for viewing the primary effects of Human, Vehicle, and Environmental factors and their influence before, during, and after a crash event. Table 1 is based on the Haddon Matrix.

Table 1: Expanded Haddon Matrix with Example Highway Safety Categories

	Human	Vehicle	Environment
Pre-Crash	· Age · Gender · Experience · Alcohol/Drugs · Physiological Condition · Psychological Condition · Familiarity with Road & Vehicle · Distraction · Conviction & Crash History · License Status · Speed	· Crash Avoidance · Vehicle Type · Size & Weight · Safety Condition, Defects · Brakes · Tires · Vehicle Age · Safety Features Installed · Registration	· Visibility · Weather/Season · Lighting · Divided Highways · Signalization · Geographic Location · Roadway Class, Surface, Cross-Section, Alignment, etc. · Structures · Traffic Control Devices, Signs, Delineations, and Markings · Roadside Appurtenances, Buildups, Driveways, etc. · Volume of Traffic · Work Zone · Animal Range Land & Seasonal Movements
Crash	· Belt Use · Human Tolerance · Size · Seating Position · Helmet Use	· Crash-Worthiness · Passenger Restraints · Airbags and Airbag Shutoff	· Guardrails · Median Barriers · Breakaway Posts · Rumble Strips and Other Safety Devices · Maintenance Status of Roadway and Devices
Post-Crash	· Age · Physical Condition · Insurance Status · Access to Health Care · Driver Control Actions · Court Actions · Probation	· Post Crash Fires · Fuel Leakage · Power Cell Securement · Hazardous Materials · Title	· Traffic Management · Bystander Care · EMS System · First Responders · Hospital Treatment · Long-Term Rehabilitation

The Haddon Matrix has proven to be a meaningful way to examine primary effects of contributing factors on crash frequency and severity. It helps decision makers to consider countermeasures designed to address specific contributing factors. In recent years, with availability of more detailed data analyses, awareness has grown about the interactions among contributing factors. A good example of such interactions would be weather and drivers' skill or experience levels. To make the contribution of interaction effects more obvious, the matrix in Table 2 can be used to supplement the Haddon Matrix.

Table 2: Examples of the Interactions among Crash Characteristics

	Human	Vehicle	Environment
Human	· Road Rage · Ped/Bike Behavior & Driver Behavior · Driver Age & Passenger Age & Number	· Familiarity with Vehicle & Training · License Class & Vehicle Type · Rollover Propensity & Driver Actions · Vehicle Ergonomics & Person Size	· Crash Avoidance · Vehicle Type · Familiarity with Roadway · Experience with Weather Conditions
Vehicle		· Vehicle Size Weight Mismatch · Under-Ride/Over-Ride · Shared Roads, No-Zone · Tire Inflation & Rollover Propensity	· Rollover Propensity & Road Configuration · Roadway Debris & Vehicle Size Weight · Vehicle Type & Weather Conditions · Vehicle Condition & Weather Conditions
Environment			· Congestion Interaction with Road Type · Congestion & Vehicle Mix & Lane Width · Animal Management Policies & Roadway Access & Seasons

Taken together, these views of traffic safety factors offer a way of thinking about highway safety issues that is both conceptually robust and practical. For the purposes of this Advisory, the most important aspect of the TRS is that it supports high-quality decision making to improve highway safety. The remainder of this section of the Advisory presents details about the various components of the TRS.

2-A: Crash Data Component

- ❑ Description and Contents

  The Crash Data Component should document the time, location, environment, and characteristics (e.g., sequence of events, rollover, etc.) of a crash. Through links to other TRS components, the Crash Data Component should identify the roadways, vehicles, and people (e.g., drivers, occupants, pedestrians) involved in the crash. These data should help to document the consequences of the crash (e.g., fatalities, injuries, property damage, and violations charged), support the analysis of crashes in general, and the analysis of crashes within specific categories defined by:

  - person characteristics (e.g., age or gender)
  - location characteristics (e.g., roadway type or specific intersections)
  - vehicle characteristics (e.g., condition and legal status)
  - the interaction of various components (e.g., time of day, day of week, weather, driver actions, pedestrian actions, etc.)

The Crash Data Component of the TRS contains basic information about every reportable (as defined by state statute) motor vehicle crash on any public roadway in the state.

- ❑ Applicable Guidelines
  Details of various data elements to be collected are described in a number of publications. The MMUCC provides a guideline for a suggested minimum set of data elements to be collected for each crash. Additional information should be collected for crashes involving an injury or fatality to meet the tracking and analysis requirements for the state and other systems (e.g., the FARS, SafetyNet).

- ❑ Data Dictionary
  Crash data should be collected using a uniform crash report form that, where applicable, has been designed and implemented to support electronic field data collection. Law enforcement personnel should receive adequate training at the academy and during periodic refreshers, to ensure that they know the purpose and uses for the data as well as how to complete each field on the form accurately.

  Information from the quality control program should be used to develop and improve the content of training. The training manual on crash reporting should be available to all law enforcement personnel. The instructions in the manual should match the edit checks that are performed on the crash data prior to its being added to the statewide crash database. The edit checks should be documented and sufficient to flag common and serious errors in the data. For example, these errors include missing or out of range values in single fields and logical inconsistencies between the data recorded in multiple fields (e.g., time of day is midnight and the lighting condition is coded as daylight). All data element definitions and all system edits should be shared with collectors, managers, and users in the form of a data dictionary that is consistent with the training manual and the crash report form.

- ❑ Process Flow
  The steps from initial crash event to final entry into the statewide crash data system should be documented in process flow diagrams. The diagram should be annotated to show the time required to complete each step and to show alternate flows and timelines depending on whether the reports are submitted in hardcopy or electronically to the statewide system. The process flow diagram should include procedures for error correction and error handling (i.e., returning reports to the originating officer/department, correction, resubmission, etc.). Process flow diagrams should show all major steps whether accomplished by staff or automated systems and should clearly distinguish between the two.

- ❑ Interface with Other Components

  The Crash Data Component has interfaces, using common linking variables shown in Table 3, to other TRS components to support the following functions:

  - Driver and vehicle data should be used to verify and validate the person and vehicle information during data entry and to flag records for possible updating in the driver or vehicle files when a discrepancy is identified. Key variables such as driver license number, vehicle identification number (VIN), license plate number, name, address, and date of birth should be available to support matching of records among the files. The Driver Data Component should also enable access to drivers' histories of crashes and convictions for traffic violations.

  - Crash data should be linked to roadway inventory and other roadway characteristics based upon location information and other automated and manual coding methods. This linkage supports location-based analysis of crash frequency and severity as well as crash rate calculations based on location-specific traffic counts.

  - Law enforcement personnel should be able to link crash, contact, incident, citation, and alcohol/drug test results through their own department's records and/or a secure law enforcement information network. For agencies with computer-aided dispatch and/or a records management system, the crash data should be linked to other data through incident, dispatch, and/or crash numbers and by names and locations to support analysis at the local level.

  - Linkage to injury surveillance data should be possible either directly or through probabilistic linkage in order to support analysis of crash outcomes and overall costs of treatment. Key variables for direct linkage include names of injured persons or EMS run report number. Key variables for probabilistic linkage include the crash date and time, crash location, person characteristics such as date of birth and gender, EMS run report number, and other particulars of the crash.

Table 3: Common Linking Variables between Crash and Other Data Components of a Traffic Records System

Crash Linkages to Other Law Enforcement and Court Files	- Incident Number - Location (street address, description, coordinates, etc.) - Personal ID (name, address, DL number, etc.)
Crash Linkages to Roadway Information	- Location Coding (linear referencing system, reference post, coordinates, local street codes)
Crash Linkages to Driver and Vehicle Information	- Driver License Number - Vehicle Identification Number - Personal Identifiers (name, address, date of birth, etc.)
Crash Linkages to Statewide Injury Surveillance System Information	- Personal Identifiers (where allowed by law) - Crash Date, Time, Location - EMS Run Report Number - Unique Patient ID Number

Furthermore, there should be data transfer and sharing linkages between state and local crash databases. The state crash data system should support the electronic transfer of crash data from a variety of law enforcement agencies' (LEAs) records management systems. The state's crash data system management should publish the specifications and editing requirements for generating the outputs from the various agency systems that can be processed into the official state crash data system.

- ❑ Quality Control Program

  The crash data should be timely, accurate, complete, and consistent and these attributes should be tracked based on a set of established quality control metrics. The overall quality of the information in the Crash Data Component should be assured based on a formal program of error/edit checking as the data are entered into the statewide system. In addition, the custodial agency and the TRCC frequently work together to establish and review the sufficiency of the quality control program and to review the results of the quality control measurements. The crash data managers should receive periodic data quality reports. There should be procedures for sharing the information with data collectors through individual and agency-level feedback, as well as training and changes to the crash report instruction manual, edit checks, and data dictionary. Example measurements are presented in Table 4.

Table 4: Examples of Quality Control Measurements for Crash Data

Timeliness	- # days from crash event to receipt for data entry on statewide database - # days for manual data entry - # days for upload of electronic data - Average # of days to enter crashes into the system - Average # of days of backlogged crash reports to be entered
Accuracy	- % of crashes located using roadway location coding method - % VINs that are valid (e.g., match to vehicle records that are validated with VIN checking software) - % of interstate motor carriers "matched" in MCMIS - % crash reports with uncorrected errors - % crash reports returned to local agency for correction
Completeness	- % LEAs with an unexplained drop in reporting one year to the next - % LEAs with expected number of crashes each month - % FARS/MCMIS match - % FARS/State Crash fatality match
Consistency	- % time that an unknown code is used in fields with that possible value - % logical error checks that fail - % compliance with MMUCC guidelines

The measures in Table 4 are examples of high-level management indicators of quality. The crash file managers should have access to a greater number of measures and be prepared to present a standard set of summary measures to the TRCC on a periodic schedule, such as monthly or quarterly.

2-B: Roadway Data Component

- ❑ Description and Contents.
  Roadway information includes roadway location, identification, and classification, as well as a description of a road's total physical characteristics and usage. These attributes should be tied to a location reference system. Linked safety and roadway information are valuable components that support a state's construction and maintenance program development. This roadway information should be available for all public roadways, including local roads.

  The state Department of Transportation (DOT) typically has custodial responsibility for the Roadway Data Component. This component should include various enterprise-related files such as:

  - Roadway Inventories
    - Pavement
    - Bridges
    - Intersections
  - Roadside Appurtenances
    - Traffic Control Devices (TCD)
    - Guard Rails
    - Barriers
  - Traffic
    - Vehicle Miles Traveled (VMT)
    - Travel by Vehicle Type
  - Other
    - Geographic Information Systems (GIS)
    - Location Reference System (LRS)
    - Project Inventories

- ❑ Applicable Guidelines
  The major guideline that pertains to the Roadway Data Component is the HPMS. This provides guidance to the states on standards for sample data collection and reporting for traffic volume counts, inventory, capacity, delay, and pavement management data elements. Guidelines and tools that address roadway data, as well as identifying which of these are expected to have the greatest correlation with crash incidences, should be considered part of this advisory. Examples of these resources are the Highway Safety Manual, Safety Analyst, and the Interactive Highway Safety Design Model. In addition, the American Association of State Highway and Transportation Officials (AASHTO) is developing a series of guides for its Strategic Highway Safety Plan. This multi-year cooperative effort includes guidelines relevant to several TRS components.

- ❑ Data Dictionary
  Roadway information should be available for all public roads in the state whether under state or local jurisdiction. The contents of the Roadway Data Component should be well documented, including data definitions for each field, edit checks,

and data collection guidelines that match the data definitions. Procedures for collection of traffic data and calculation of vehicle miles traveled (VMT) should be documented as well.

- ❑ Process Flow
  The steps from initial event to final entry onto the statewide roadway data system should be documented in process flow diagrams for each file that are part of the Roadway Data Component. The diagrams should be annotated to show the time required to complete each step and to show alternate flows and timelines depending on whether data are submitted in hardcopy or electronically to the statewide system. The process flow diagram should include processes for error correction and error handling (i.e., returning reports to the original source for correction, resubmission, etc.). Process flow diagrams should show all major steps whether accomplished by staff or with automated systems and clearly distinguish between the two.

- ❑ Interface with Other Traffic Records System Components
  A location reference system should be used to link the various components of roadway information as well as other TRS information sources, especially crash information, for analytical purposes. Compatible location coding methodologies should apply to all roadways, whether state or locally maintained. When using a GIS, translations should be automatic between legacy location codes and geographic coordinates. This process should be well established and documented. Compatible levels of resolution for location coding for crashes and various roadway characteristics should support meaningful analysis of these data.

- ❑ Quality Control Program
  The roadway data should be timely, accurate, complete, and consistent and these attributes should be tracked based on a set of established quality control metrics. The overall quality of the roadway data should be assured based on a formal program of error and edit checking as the data are entered into the statewide system and procedures should be in place for addressing the detected errors. In addition, the custodial agency and the TRCC should frequently work together to establish and review the sufficiency of the quality control program and to review the results of the quality control measurements. The roadway data managers should receive periodic data quality reports. There should be procedures in place for sharing the information with data collectors through individual and agency-level feedback, as well as training and changes to the applicable instruction manuals, edit checks, and roadway data dictionary. Audits and validation checks should be conducted as part of the quality control program to assure the accuracy of specific critical data elements. Example measurements are shown in Table 5.

Table 5: Examples of Quality Control Measurements for Roadway Data

Timeliness	- % of traffic counts conducted each year - # days from crash event to location coding of crashes - # days from construction completion to roadway inventory update
Accuracy	- % of crashes located using roadway location coding method - % errors found during data audits of critical data elements
Completeness	- % traffic data based on actual counts within officially prescribed timing - % public roadways listed in the inventory

The measures in Table 5 are examples of high-level management indicators of quality. The managers of individual roadway files should have access to a greater number of measures. The custodial agency should be prepared to present a standard set of summary measures to the TRCC monthly or quarterly.

2-C: Driver Data Component

- Description and Contents

  Driver information should include data about the state's population of licensed drivers, as well as data about convicted traffic violators who are not licensed in that state. Information about persons licensed by the state should include: personal identification, driver license number, type of license, license status, driver restrictions, convictions for traffic violations in this state and the history of convictions for critical violations in prior states, crash history whether or not cited for a violation, driver improvement or control actions, and driver education data.

  Custodial responsibility for the Driver Data Component usually resides in a state Department or Division of Motor Vehicles. Some commercial vehicle operator-related functions may be handled separately from the primary custodial responsibility for driver data. The structure of driver databases should be typically oriented to individual customers.

- Applicable Guidelines

  The ANSI D-20 standard should be used to develop data definitions for traffic records-related information in the driver and vehicle files. Driver information should be maintained to accommodate information obtained through interaction with the NDR via the PDPS and the CDLIS. This enables the state to maintain complete driving histories and prevent drivers from circumventing driver control actions and obtaining multiple licenses. Data exchange for PDPS and CDLIS should be accomplished using the American Association of Motor Vehicle Administrators (AAMVA) Code Dictionary. Security and personal information verification should be in accordance with the provisions of the Real ID act.

- Data Dictionary

  At a minimum, driver information should be available for all licensed drivers in the state and for all drivers convicted of a serious traffic violation (regardless of

where or whether the person is licensed). The contents of the driver data files should be well documented with data definitions for each field, and where applicable, edit checks and data collection guidelines that match the data definitions. Procedures for collecting, reporting and posting of license, conviction, and license sanction information should be documented.

- ❑ Process Flow
  The steps, from initial event (licensure, traffic violation, etc.) to final entry onto the statewide driver and vehicle data files, should be documented in process flow diagrams for each file that is part of the Driver Data Component. The diagram should be annotated to show the time required to complete each step and to show alternate flows and timelines depending on whether the data are submitted in hardcopy or electronically to the statewide system. The process flow diagram should include processes for error correction and error handling (i.e., returning reports to the original source for correction, resubmission, etc.). The process flow should also document the timing, conditions, and procedures for purging records from the driver files. Process flow diagrams should show all major steps whether accomplished by staff or automated systems and clearly distinguish between the two. The steps also should be documented in those states that have administrative authority to suspend licenses based on a DUI arrest independent of the judicial processing of those cases.

- ❑ Interface with Other Traffic Records System Components
  The Driver Data Component should have interfaces (using common linking variables shown in Table 6) to other TRS components such that the following functions could be supported:

  - Driver component data should be used to verify/validate the person information during data entry in the crash data system and to flag records for possible updating in the driver or vehicle files when a discrepancy is identified. Key variables such as driver license number, name, address, and date of birth should be available to support matching of records among the files. Social Security Numbers should be validated for interstate records exchange.

  - Driver and vehicle owner addresses are useful for geographic analyses in conjunction with crash and roadway data components. Linkage in these cases should be based on conversions of addresses to location codes and/or geographic coordinates in order to match the location coding method used in the roadway data component and in the GIS.

  - Links between driver convictions and citation/adjudication histories are useful in citation tracking, as well as in systems for tracking specific types of violators (DUI [Driving Under the Influence] tracking systems, for example). Even if a citation tracking system is lacking, there is value in being able to link to data from enforcement or court records on the initial charges in traffic cases. These linkages should be based usually on driver name and driver

license number but other identifiers may be used as well. The National Center for State Courts (NCSC) is looking for these identifiers in addition to methods to improve data sharing. "NCSC offers solutions that enhance court operations with the latest technology; collects and interprets the latest data on court operations nationwide; and provides information on proven *best practices* for improving court operations." (http://www.ncsconline.org/)

- Linkage to injury surveillance data should be possible either directly or through probabilistic linkage in order to support analysis of crash outcomes and crash risk associated with specific driver characteristics (e.g., the driver's history of violations or crash involvement). Key variables should include names, date of birth, dates, times, and locations of crashes and citations.

Table 6: Common Linking Variables between Driver and Other Data Components of a Traffic Records System

Driver Linkages to Other Law Enforcement & Court Files	- Citation Number & Case Number - Location (street address, description, coordinates, etc.) - Personal ID (name, address, DL number, date of birth, etc.)
Driver Linkages to Roadway Information	- Driver Addresses (location code, coordinates)
Driver Linkages to Crash Information	- Driver License Number - Personal Identifiers (name, address, date of birth, etc.)
Driver Linkages to Statewide Injury Surveillance System Information	- Personal Identifiers (where allowed by law) - Crash Date, Time, Location

❑ Quality Control Program

The driver data should be timely, accurate, complete, and consistent and these attributes should be tracked based on a set of established quality control metrics. The overall quality of the information in the Driver Data Component should be assured based on a formal program of error/edit checking as data are entered into the statewide system and procedures should be in place for addressing the detected errors. In addition, the custodial agency (or agencies) and the TRCC should work together frequently to establish and review the sufficiency of the quality control program and to review the results of the quality control measurements. The driver data managers should receive periodic data quality reports. There should be procedures in place for sharing the information with data collectors through individual and agency-level feedback, as well as through training and changes to the applicable instruction manuals, edit checks, and the driver and vehicle data dictionaries. Audits and validation checks to assure the accuracy of specific critical data elements should be conducted as part of the formal quality control program. Example quality control measurements are presented in Table 7.

Table 7: Examples of Quality Control Measurements for Driver Data

Timeliness	- Average time to post driver licenses - Average time to post convictions after receipt at DMV - Average time to forward dispositions from court to DMV
Accuracy	- % of duplicate records for individuals - % errors found during data audits of critical data elements
Completeness	- % drivers records checked for drivers moving into the state - % of driver records transferred from prior state
Consistency	- % of SSN verified online - % of immigration documents verified online - % violations reported from other states added to driver history

The measures in Table 7 are examples of high-level management indicators of quality. The managers of individual driver files should have access to a greater number of measures. The custodial agency should be prepared to present a standard set of summary measures to the TRCC monthly or quarterly.

2-D: Vehicle Data Component

- ❑ Description and Contents

  Vehicle information includes information on the identification and ownership of vehicles registered in the state. Data should be available regarding vehicle make, model, year of manufacture, body type, and vehicle history (including odometer readings) in order to produce the information needed to support analysis of vehicle-related factors that may contribute to a state's crash experience. Such analyses would be necessarily restricted to crashes involving in-state registered vehicles only.

  Custodial responsibility for the vehicle data usually resides in a state Department or Division of Motor Vehicles. Some commercial vehicle -related functions may be handled separately from the primary custodial responsibility for all other vehicle data. The structure of vehicle databases is typically oriented to individual "customers."

- ❑ Applicable Guidelines

  Title and registration information, including stolen and salvage indicators, should be available and shared with other states. The National Motor Vehicle Title Information System (NMVTIS) facilitates such exchanges. In addition, some states empower auto dealers to transact vehicle registrations and title applications following the Business Partner Electronic Vehicle Registration (BPEVR) guidelines from AAMVA. The International Registration Plan (IRP), a reciprocity agreement among U.S states and Canadian provinces, administers the registration processes for interstate commercial vehicles.

- ❑ Data Dictionary
  Vehicle information should be available for all vehicles registered in the state. The contents of the Vehicle Data Component's files should be well documented, including data definitions for each field, and where applicable, edit checks and data collection guidelines that match the data definitions. Procedures for collection, reporting and posting of registration, title, and title brand information should be documented.

- ❑ Process Flow
  The steps from initial event (registration, title, etc.) to final entry onto the statewide vehicle data files should be documented in process flow diagrams for each file that is part of this component. The diagram should be annotated to show the time required to complete each step and to show alternate flows and timelines depending on whether the data are submitted in hardcopy or electronically to the statewide system. The process flow diagram should include processes for error correction and error handling (i.e., returning reports to the original source for correction, resubmission, etc.). The process flow should also document the timing, conditions, and procedures for purging records from the vehicle files. Process flow diagrams should show all major steps whether accomplished by staff or automated systems and should clearly distinguish between the two.

- ❑ Interface with Other Traffic Records System Components
  The Vehicle Data Component has interfaces (using common linking variables shown in Table 8) to other TRS components such that the following functions should be supported:

  - Vehicle data should be used to verify/validate the vehicle information during data entry in the crash data system, and to flag records for possible updating in the vehicle files when a discrepancy is identified. Key variables such as VIN, license plate number, names, and addresses should be available to support matching of records among the files.

  - Vehicle owner addresses are useful in geographic analyses in conjunction with crash and roadway data. Linkage in these cases should be based on conversions of addresses to location codes and/or geographic coordinates in order to match the location coding method used in the Roadway Data Component and in the GIS.

  - As with crash data, linkage to injury surveillance data should be possible either directly or through probabilistic linkage in order to support analysis of crash outcomes and crash risk associated with specific driver characteristics (e.g., the driver's history of violations or crash involvement). Key variables should include names and dates, date of birth, times, and locations of crashes.

Table 8: Common Linking Variables between Vehicle and Other Data Components of a Traffic Records System

Vehicle Linkages to Other Law Enforcement & Court Files	- Location (street address, description, coordinates, etc.) - Personal ID (name, address, DL number, etc.)
Vehicle Linkages to Roadway Information	- Owner Addresses (location code, coordinates)
Vehicle Linkages to Crash Information	- Vehicle Identification Number - Personal Identifiers (name, address, date of birth, etc.)
Vehicle Linkages to Statewide Injury Surveillance System Information	- Personal Identifiers (where allowed by law) - Crash Date, Time, Location

- Quality Control Program

The vehicle data should be timely, accurate, complete, and consistent and these attributes should be tracked based on a set of established quality control metrics. The overall quality of the vehicle data should be assured based on a formal program of error/edit checking as the data are entered into the statewide system and procedures should be in place for addressing the detected errors. In addition, the custodial agency (or agencies) and the TRCC should work together frequently to establish and review the sufficiency of the quality control program and to review the results of the quality control measurements. The vehicle data managers should receive periodic data quality reports. There should be procedures in place for sharing the information with data collectors through individual and agency-level feedback, as well as training and changes to the applicable instruction manuals, edit checks, and the driver and vehicle data dictionaries. Audits and validation checks should be conducted to assure the accuracy of specific critical data elements as part of the formal Quality Control Program. Example measurements are presented in Table 9.

Table 9: Examples of Quality Control Measurements for Vehicle Data

Timeliness	- Average time for DMV to post title transactions - % title transactions posted within prescribed timing
Accuracy	- % of duplicate records for individuals - % errors found during data audits of critical data elements - % VINs successfully validated with VIN checking software
Completeness	- **%** of records with complete owner name and address

The measures in Table 9 are examples of high-level management indicators of quality. The managers of individual vehicle files should have access to a greater number of measures. The custodial agency should be prepared to present a standard set of summary measures to the TRCC monthly or quarterly.

2-E: Citation/Adjudication Data Component

- ❑ Description and Contents

  Information, which identifies arrest and adjudication activity of the state, should be available, including information that tracks a citation from the time of its distribution to a law enforcement officer, through its issuance to an offender, its disposition, and the posting of conviction in the driver history database. Case management systems, law enforcement records systems, and DMV driver history systems should share information to support:

  - citation tracking
  - case tracking
  - disposition reporting
  - specialized tracking systems for specific types of violators (e.g., DUI tracking systems)

  Information should be available to identify the type of violation, location, date and time, the enforcement agency, court of jurisdiction, and final disposition. Similar information for warnings and other motor vehicle incidents that would reflect enforcement activity are also useful for highway safety purposes and should be available at the local level.

  The information should be used in determining the level of enforcement activity in the state, for accounting and controlling of citation forms, and for detailed monitoring of court activity regarding the disposition of traffic cases.

  Custodial responsibility for the multiple systems that make up the Citation/ Adjudication Data Component should be shared among local and state agencies, with law enforcement, courts, and the Department of Motor Vehicles (DMV) sharing responsibility for some files (e.g., portions of the citation tracking system). State-level agencies should have responsibility for managing the law enforcement information network (e.g., a criminal justice information agency), for coordinating and promoting court case management technology (e.g., an administrative arm of the State Supreme Court), and for assuring that convictions are forwarded to the DMV and actually posted to the drivers' histories (e.g., the court records custodian and the DMV).

- ❑ Applicable Guidelines

  Data definitions should meet the standards for national law enforcement and court systems. Applicable guidelines are defined for law enforcement data in:

  - National Crime Information Center (NCIC)
  - Uniform Crime Reporting (UCR)
  - National Incident-Based Reporting System (NIBRS)
  - National Law Enforcement Telecommunication System (NLETS)
  - Law Enforcement Information Network (LEIN)
  - Traffic Court Case Management Systems Functional Requirement Standards

Applicable guidelines should be defined for court records in the National Center for State Courts (NCSC), and jointly for courts and law enforcement in the GJXDM (with specific Traffic Processing Standards created through a national committee). Tracking systems for citations (i.e., a citation tracking system) and for specific classes of violators (e.g., a DUI tracking system) should meet the specifications for such systems published by NHTSA.

- ❑ Data Dictionary

  The citation/adjudication data files should be well documented, including data definitions for each field and where applicable, edit checks and data collection guidelines that match the data definitions. Procedures for collection, reporting and posting of license, registration, conviction, and title brand information should be documented.

  Law enforcement personnel should receive adequate training at the academy and during periodic refreshers to ensure they know the purpose and uses for the data. Training also should ensure that officers know how to access information on violators and process citations and arrests properly. The training manual should be available to all law enforcement personnel and the instructions should match, as appropriate, the edit checks that are performed on the data prior to its being added to the local records management system and statewide databases. The edit checks should be documented and both common and serious errors in the data should be flagged, including missing or out-of-range values and logical inconsistencies. The data element definitions and system edits should be shared with all collectors, managers, and users in the form of a data dictionary that is consistent with the training manual and the crash report form. Court case management systems and tracking systems (citation tracking and DUI tracking) should be well documented to include definitions of all data elements and corresponding edit checks to ensure accuracy.

- ❑ Process Flow

  The processing of traffic violations, citations, arrests, and court cases should be documented in a series of flow diagrams showing the typical procedures and their average time to completion for each step. The administrative handling of payment in lieu of court appearance should be shown separately from those violations that are not handled administratively. The processes for detecting drugs or collecting blood alcohol concentration (BAC) values through various methods (breath test, blood or urine tests) should also be documented. The processes for tracking DUI cases in a DUI tracking system should also be included in the set of process flow diagrams. Processes for paper and electronic filing and reporting should be shown separately. Process flow diagrams should show all major steps whether accomplished by staff or automated systems and clearly distinguish between the two.

- ❑ Interface with other traffic records system components
  NCIC, GJXDM, NIBRS, LEIN, and NLETS guidelines all define methods and data standards for information transfer and sharing at the state and national level. Typically, there are state-level equivalents of the various networks and standards governing the sharing of law enforcement and court-related data. For the purposes of safety analysis at a state and local level, linkage between the Citation/Adjudication Data Component and other components of the TRS is important because it is useful for analyzing the geographic distribution of traffic violations and incidents, as well as monitoring the effectiveness of countermeasures that involve enforcement or court processes. It also enables the creation and updating of adverse driver histories for the purpose of driver control. Key linkages within the TRS for citation/adjudication information are listed in Table 10.

Table 10: Common Linking Variables between Citation/Adjudication and Other Data Components of a Traffic Records System

Citation/Adjudication Linkages to Other Law Enforcement Files and Tracking Systems	- Computer Aided Dispatch (CAD) Record Number - Citation/Arrest/Incident Number, Court Case Number - Location (street address, description, coordinates, etc.) - Personal ID (name, address, DL number, etc.)
Citation/Adjudication Linkages to Driver/Vehicle Files	- Driver and Owner Names, Driver License Number - Driver & Owner Addresses (location code, coordinates) - Vehicle Plate Number, VIN
Citation/Adjudication Linkages to Statewide Injury Surveillance System Information	- Personal Identifiers (where allowed by law) - Crash-Related Citation/Arrest Date, Time, Location

- ❑ Quality Control Program
  The citation/adjudication data should be timely, accurate, complete, and consistent and these attributes should be tracked based on a set of established quality control metrics. The overall quality of the citation/adjudication data should be assured based on a formal program of error/edit checking as the data are entered into the statewide system, and procedures should be in place for addressing the detected errors. In addition, the custodial agency (agencies) and the TRCC should frequently work together to establish and review the sufficiency of the quality control program and to review the results of the quality control measurements. The data managers receive regular, periodic data quality reports. There should be procedures in place for sharing the information with data collectors through individual and agency-level feedback as well as training and changes to the applicable instruction manuals, edit checks, and the driver and vehicle data dictionaries. Audits and validation checks should be conducted to assure the accuracy of specific critical data elements as part of the formal Quality Control Program. Example measurements are presented in Table 11.

Table 11: Examples of Quality Control Measurements for Citation/Adjudication Data

Timeliness	- Average time for citations to be sent from LEAs to courts - Average time for convictions to be sent to DMV
Accuracy	- % errors found during data audits of critical data elements - % violations narratives that match the proper state statute
Completeness	- % of cases with both original charges and dispositions in citation tracking system
Consistency	- % traffic citations statewide written on a single uniform citation

The measures in Table 11 are examples of high-level management indicators of quality. The managers of individual citation/adjudication files should have access to a greater number of measures. The custodial agency should be prepared to present a standard set of summary measures to the TRCC monthly or quarterly.

2-F: Statewide Injury Surveillance System (SWISS) Data Component

- ❑ Description and Contents

  With the growing interest in injury control programs within the traffic safety, public health, and enforcement communities, there are a number of local, state, and federal initiatives that drive the development of a SWISS. These systems typically incorporate pre-hospital (EMS), trauma, emergency department (ED), hospital in-patient/discharge, rehabilitation and morbidity databases to track injury causes, magnitude, costs, and outcomes. Often, these systems rely upon other components of the TRS to provide information on injury mechanisms or events (e.g., traffic crash reports). The custodial responsibility for various files within the SWISS typically is distributed among several agencies and/or offices within a State Department of Health.

  This system should allow the documentation of information that tracks magnitude, severity, and types of injuries sustained by persons in motor vehicle related crashes. Although traffic crashes cause only a portion of the injuries within any population, they often represent one of the more significant causes of injuries in terms of frequency and cost to the community. The SWISS should support integration of the injury data with police reported traffic crashes and make this information available for analysis to support research, public policy, and decision making.

  The use of these data should be supported through the provision of technical resources to analyze and interpret these data in terms of both the traditional traffic safety data relationships and the specific data relationships unique to the health care community. In turn, the use of the SWISS should be integrated into the injury control programs within traffic safety, and other safety-related programs at the state and local levels.

- ❑ Applicable Guidelines
  NHTSA has produced the National Emergency Medical Service Information System (NEMSIS) to serve as a guideline for a uniform pre-hospital dataset. It applies to all EMS runs, not just those related to traffic crashes. The American College of Surgeons (ACS) certifies trauma centers and provides guidelines for trauma registry databases and for a National Trauma Databank. Emergency Department and in-patient data guidelines (UB-92) are available from the US Department of Health and Human Services. The National Center for Health Statistics, within the Centers for Disease Control (CDC), sets ICD-9 codes and E-codes for injury morbidity/mortality. These codes are updated as needed and the ICD-10 codes are expected by the fall of 2007. The CDC also sets standards for reporting to their injury database and for use of the Public Health Information Network for data sharing.

- ❑ Data Dictionary
  The contents of the SWISS Data Component's files should be well documented to include data definitions for each field, and where applicable, edit checks and data collection guidelines that match the data definitions. Procedures should be documented in instruction manuals for collection, reporting, and posting of EMS run data on a uniform run report, uniform data in various hospital and trauma databases, and for tracking morbidity and mortality for each system.

  Training should include (where applicable) data collection, data entry, use of various injury coding systems (ICD and E-codes) as well as injury and trauma severity scoring systems such as the Injury Severity Score (ISS), Revised Trauma Score (RTS), and Abbreviated Injury Score (AIS) scales.

- ❑ Process Flow
  The information and processes involved in transport and treatment of victims of crash-related injuries should be documented in a series of flow diagrams showing the typical data collection and management processes and their average time to completion for each step in the data flow process. Processes for paper and electronic filing and reporting should be shown separately. Process flow diagrams should show all major steps whether accomplished by staff or automated systems and clearly distinguish between the two.

- ❑ Interface with other Traffic Records System Components
  Data transfer and sharing between local systems and the SWISS should be governed by data definitions, quality control requirements, and data transfer protocols defined by the custodial agencies. Transfer and sharing between SWISS files and the relevant national databases are governed by the data definitions, quality control requirements, and data transfer protocols for those systems (e.g., National Trauma Database).

  The CODES project is the primary example of data sharing and integration between SWISS and the other components of a TRS. It can take the form of direct linkage using personal identifiers or probabilistic linkage using other data

elements such as incident time, date, date of birth, and locations, responding officer/agency, and others. Key linkages within the TRS for SWISS information are listed in Table 12.

Table 12: Common Linking Variables between SWISS and Other Data Components of a Traffic Records System

Linkages Internal to the SWISS data on injury and healthcare treatments/outcomes	- Patient name - Patient ID number - EMS run report number - Social Security Number
Linkages between SWISS data and Crash Data	- Personal Identifiers: Name, address, date of birth (direct linkage) - CODES linking variables (probabilistic linkage) - EMS run report number - Crash Report Number
Linkages between SWISS data and other (non-Crash) components of the traffic records system	- Name & SSN linked to driver file (direct linkage) - Location/address - Event & treatment date and time

- Quality Control Program

The SWISS data should be timely, accurate, complete, and consistent and these attributes should be tracked based on a set of established quality control metrics. The overall quality of the information in the SWISS Data Component should be assured based on a formal program of error/edit checking as the data are entered into the statewide system and procedures should be in place for addressing the detected errors. In addition, the custodial agency (or agencies) and the TRCC should work together frequently to establish and review the sufficiency of the quality control program and to review the results of the quality control measurements. The data managers should receive periodic data quality reports. There should be procedures in place for sharing the information with data collectors through individual and agency-level feedback, as well as to provide modifications to applicable training and instruction manuals, edit checks, and the SWISS data dictionaries. Audits and validation checks to assure the accuracy of specific critical data elements should be conducted as part of the formal Quality Control Program. Example quality control measurements are presented in Table 13.

Table 13: Examples of Quality Control Measurements for the Statewide Injury Surveillance System

Timeliness	- Average time for EMS run reports to be sent to governing agency - % EMS run reports sent to governing agency in the prescribed time - Average time from treatment & discharge from ED to record availability in the ED discharge database - Average time from patient discharge to record availability in the hospital discharge database - Average time from date of incident to record appearing in the trauma registry - # days from death to appearance of record on mortality database
Accuracy	- % EMS run locations that match statewide location coding - % correct ICD-9 and E-codes - % errors found during data audits of critical data elements in EMS, ED, trauma registry, hospital discharge, & mortality databases
Completeness	- % of traffic crash-related EMS runs in the EMS database - % of ED visits for crash-related injuries recorded in ED discharge database. - % of trauma cases represented in the trauma registry - % of SCI/TBI cases represented in the SCI/TBI registries
Consistency	- % correct ICD-9 and E-codes (see also accuracy) - CODES match rate (where applicable) - % crash-related deaths with motor vehicle crash coded in cause of death field on death certificate

The measures in Table 13 are examples of high-level management indicators of quality. The managers of individual medical data files should have access to a greater number of measures. The custodial agencies should be prepared to present standard sets of summary measures to the TRCC monthly or quarterly.

APPENDIX A. Resources

AASHTO Strategic Highway Safety Plan. Dec. 2004. American Association of State Highway and Transportation Officials. 20 Mar. 2006 <http://safety.transportation.org/doc/Safety-StrategicHighwaySafetyPlan.pdf>.

Administrative Ruling #119. n.d. Federal Motor Carrier Safety Administration. 20 Mar. 2006 <http://www.fmcsa.dot.gov/documents/adminrule.pdf>.

Anti Car Theft Improvements Act of 1996. 3 Jan. 1996. American Association of Motor Vehicle Administrators. 20 Mar. 2006 <http://www.aamva.org/Documents/vehAntiCarTheftImprovAct1996.pdf>.

Bahar, G., M. Masliah, C. Mollett, and B. Persaud. Integrated Safety Management Process (NCHRP Synthesis 501). 2003. Transportation Research Board. 17 Mar. 2006 <http://trb.org/publications/nchrp/nchrp_rpt_501.pdf>.

Branding Best Practices. Sep. 2002. American Association of Motor Vehicle Administrators. 17 Mar. 2006 <http://www.aamva.org/Documents/vehBrandingBestPractices.pdf>.

Business Partner Electronic Vehicle Registration. n.d. American Association of Motor Vehicle Administrators. 17 Mar. 2006 <http://www.aamva.org/vehicles/veh_AutoSystBPEVROverview.asp>.

Conference Proceedings on Intersection Safety: Achieving Solutions through Partnerships. *The Toolbox on Intersection Safety and Design: Data Collection and Analysis for Improved Operations.* March 2004. Irvine, California.

Council, F. Report to the Committee for Review of the Federal Motor Carrier Safety Administration Truck Crash Causation Study. 4 Sep. 2003. Transportation Research Board. 17 Mar. 2006 <http://trb.org/publications/reports/tccs_sept_2003.pdf>.

Data Element Dictionary for Traffic Records Systems (ANSI D20-2003). Apr. 2003. American Association of Motor Vehicle Administrators. 17 Mar. 2006 <http://www.aamva.org/Documents/std2003_ANSI_DICTIONARY_FINAL.pdf>.

Defining Compacts: Jurisdictional Agreements. 28 Oct. 2004. American Association of Motor Vehicle Administrators. 17 Mar. 2006 <http://www.aamva.org/drivers/mnu_drvCompacts.asp>.

DeLucia, B.H., and R.A. Scopatz. NCHRP Synthesis 350: Crash Records Systems: A Synthesis of Highway Practice. Jan. 2006. Transportation Research Board. 17 Mar. 2006 <http://trb.org/publications/nchrp/nchrp_syn_350.pdf>.

Depue, L. Safety Management Systems (NCHRP Synthesis 322). 2003. Transportation Research Board. 17 Mar. 2006 <http://trb.org/publications/nchrp/nchrp_syn_322.pdf>.

DL/ID Card Design Specifications. 26 Sep. 2003. American Association of Motor Vehicle Administrators. 20 Mar. 2006 <http://www.aamva.org/IDSecurity/idsCardDesignSpecifications_UID7.asp>.

DL/ID Security Framework. Feb. 2004. American Association of Motor Vehicle Administrators. 20 Mar. 2006 <http://www.aamva.org/Documents/idsAAMVASecurityFramework_Feb2004.pdf>.

DL/ID Standard. 6 Jun. 2005. American Association of Motor Vehicle Administrators. 20 Mar. 2006 <http://www.aamva.org/standards/stdAAMVADLIdStandard2000.asp>.

Driver Record Information Verification System (DRIVerS). 24 Jan. 2006. American Association of Motor Vehicle Administrators. 17 Mar. 2006 <http://www.aamva.org/drivers/drv_AutomatedSystemsDRIVerS.asp>.

DUI Tracking System Pilot Program, Federal Register (Volume 69, Number 116). June 17, 2004. National Highway Traffic Safety Administration. 20 Mar. 2006 <http://a257.g.akamaitech.net/7/257/2422/06jun20041800/edocket.access.gpo.gov/2004/pdf/04-13611.pdf>.

Fekpe, E.S., T. Windholz, K. Beard, and K. Novak. Quality and Accuracy of Positional Data in Transportation (NCHRP Report 506). 2003. Transportation Research Board. 20 Mar. 2006 <http://trb.org/publications/nchrp/nchrp_rpt_506.pdf>.

Finison, K.S. Standardized Reporting Using CODES (Crash Outcome Data Evaluation System). Apr. 2000. National Highway Transportation Safety Administration. 17 Mar. 2006 <http://www-nrd.nhtsa.dot.gov/pdf/nrd-30/NCSA/CODES/809-048.pdf>.

Gabler, H.C., D.J. Gabauer, H.L. Newell, and M.E. O'Neill. Use of Event Data Recorder (EDR) Technology for Highway Crash Data Analysis (NCHRP 17-24). Dec. 2004. Transportation Research Board. 20 Mar. 2006 <http://trb.org/publications/nchrp/nchrp_w75.pdf>.

GIS in Transportation. n.d. Federal Highway Administration. 17 Mar. 2006 <http://www.gis.fhwa.dot.gov/fhwaEfforts.asp>.

Global Justice XML Data Model (Global JXDM). n.d. U.S. Department of Justice. 20 Mar. 2006 <http://it.ojp.gov/jxdm>.

Guidance for Implementation of the AASHTO Strategic Highway Safety Plan (NCHRP 17-18(3)). 21 Feb. 2006. Transportation Research Board. 17 Mar. 2006 <http://www4.nationalacademies.org/trb/crp.nsf/All+Projects/NCHRP+17-18(3)>.

Highway Safety: Improved Monitoring and Oversight of Traffic Safety Data Program Are Needed. Nov. 2004. Government Accountability Office. 17 Mar. 2006 <http://www.gao.gov/new.items/d0524.pdf>.

Highway Safety Improvement Program. 13 Dec. 2005. Federal Highway Administration. 17 Mar. 2006 <http://safety.fhwa.dot.gov/state_program/hsip/index.htm>.

Highway Safety Manual. n.d. Transportation Resource Board. 17 Mar. 2006 <http://www.highwaysafetymanual.org/>.

Index to HSIS Summary Reports. 8 Aug. 2001. Federal Highway Administration. 17 Mar. 2006 <http://www.hsisinfo.org/pdf/sum.htm>.

Initiatives to Address Improvement of Traffic Safety Data. Jul. 2004. National Highway Traffic Safety Administration. 17 Mar. 2006 <http://www.nhtsa.dot.gov/people/crash/crashstatistics/trafficsafetydata_IPT_Report.htm>.

Intelligent Transportation Systems of America. 17 Mar. 2006 <http://www.itsa.org/what_is_its/c8/What_is_ITS.html>.

Interactive Highway Safety Design Model. n.d. Federal Highway Administration. 17 Mar. 2006 <http://www.tfhrc.gov/safety/ihsdm/ihsdm.htm>.

International Registration Plan (IRP). Sep. 1973. American Association of Motor Vehicle Administrators. 17 Mar. 2006 <http://www.aamva.org/IRP/documents/pub_ThePlan.pdf>.

International Registration Plan (IRP). n.d. American Association of Motor Vehicle Administrators. 20 Mar. 2006 <http://www.aamva.org/irp>.

Johnson, S.W., and J. Walker. n.d. The Crash Outcome Data Evaluation System (CODES), Report DOT HS 808 338. Jan. 1996. National Highway Traffic Safety Administration. 20 Mar. 2006 <http://www-nrd.nhtsa.dot.gov/pdf/nrd-30/NCSA/CODES/codestch.pdf>.

Justice Standards Clearinghouse for Information Sharing. n.d. U.S. Department of Justice. 17 Mar. 2006 <http://it.ojp.gov/jsr/public/index.jsp>.

Large Truck Crash Causation Study Interim Report. Sep. 2002. National Highway Traffic Safety Administration. 17 Mar. 2006 <http://www-nrd.nhtsa.dot.gov/pdf/nrd-30/NCSA/Rpts/2002/809-527.pdf>.

Lerner, N., R. Llaneras, A. Smiley, and F. Hanscom. Comprehensive Human Factors Guidelines for Road Systems (NCHRP Web-Only Document 70 (Project 17-18(08))). Mar. 2005. Transportation Research Board. 17 Mar. 2006 <http://trb.org/publications/nchrp/nchrp_w70.pdf>.

Manual on Classification of Motor Vehicle Traffic Accidents, Sixth Edition (ANSI D16.1-1996). 28 Oct. 1996. National Safety Council. 17 Mar. 2006 <http://www.nsc.org/public/mem/ansid16_1.pdf>.

MMUCC Guideline: 2nd Edition. 2003. National Highway Traffic Safety Administration. 17 Mar. 2006 <http://www-nrd.nhtsa.dot.gov/pdf/nrd-30/NCSA/MMUCC/2003/MMUCC_02.pdf>.

Model Kit Car and Street Rod Definitions and Procedures. 2005. American Association of Motor Vehicle Administrators. 20 Mar. 2006 <http://www.aamva.org/documents/nwspolicybookandappendices.pdf?ct=all&qu=model%20kit%20car%20and%20street%20rod%20&st=r&action=search>.

Model Minimum Uniform Crash Criteria (MMUCC): Second Edition. 2003. National Highway Traffic Safety Administration. 20 Mar. 2006 <http://www-nrd.nhtsa.dot.gov/pdf/nrd-30/NCSA/MMUCC/2003/MMUCC_02.pdf>.

Motor Carrier Management Information System Crash Report Data Elements and Their Definitions. n.d. Federal Motor Carrier Safety Administration. 20 Mar. 2006 <http://mcmiscatalog.fmcsa.dot.gov/beta/Catalogs&Documentation/documentation/Crashes/crash3.asp>.

National Agenda for the Improvement of Highway Safety Information Systems. n.d. Association of Transportation Safety Information Professionals. 23 Mar 2006 <http://www.atsip.org/images/uploads/National_Agenda.pdf>

National Association of Trailer Manufacturers (NATM). 20 Mar. 2006 <http://www.natm.com>.

National Electronic Injury Surveillance System (NEISS) On-line. n.d. U.S. Consumer Product Safety Commission. 17 Mar. 2006 <http://www.cpsc.gov/library/neiss.html>.

National EMS Information System Fact Sheet. 2004. National EMS Information System. 17 Mar. 2006 <http://www.nemsis.org/media/pdf/NEMSIS%20Fact%20Sheet%206-2005.pdf>.

National Highway Traffic Safety Administration. Traffic Safety Information Systems Strategic Planning Process – A Guide for States. March 2006. <http://www.nhtsa-tsis.net/planning/>

National Incident-Based Reporting System (NIBRS) Implementation Program. 15 July 2005. Bureau of Justice Statistics. 17 Mar. 2006 <http://www.ojp.usdoj.gov/bjs/nibrs.htm>

National Law Enforcement Telecommunication System (NLETS). 17 Mar. 2006 <http://www.nlets.org/general.html>.

National Model: Statewide Application of Data Collection and Management Technology to Improve Highway Safety (Report FHWA-RD-99-140). 1999. Federal Highway Administration. 20 Mar. 2006 <http://www.tfhrc.gov/safety/national>.

National Motor Vehicle Title Information System, State Batch Procedures Manual 2004. Aug. 2004. American Association of Motor Vehicle Administrators. 20 Mar. 2006 <http://aamva.net/Documents/vehNMVTISBatchStateProceduresManual_2004.pdf>.

NCSC - Helping Courts Anticipate Change and Better Serve the Public. 14 Mar 2006. National Center for State Courts. 23 Mar 2006 <http://www.ncsconline.org/>.

NEMSIS NHTSA Version 2.2 Data Dictionary. 2005. National EMS Information System. 17 Mar. 2006 <http://www.nemsis.org/media/pdf/NEMSIS%20Version%202.2%20Data%20Dictionary%20Final.pdf>.

NMVTIS Pilot. 25 Apr. 2002. American Association of Motor Vehicle Administrators. 17 Mar. 2006 <http://www.aamva.org/vehicles/veh_AutoSystNMVTISPilot.asp>.

NMVTIS Titling of Stolen Cars. n.d. American Association of Motor Vehicle Administrators. 20 Mar. 2006 <http://www.aamva.org/vehicles/veh_AutoSystNMVTISStolenCarTitles.asp>.

NMVTIS Vehicle Fraud. n.d. American Association of Motor Vehicle Administrators. 20 Mar. 2006 <http://www.aamva.org/vehicles/veh_AutoSystNMVTISVehFraud.asp>.

Operating Authority Classifications. 19 Mar. 2002. Federal Motor Carrier Safety Administration. 20 Mar. 2006 <http://www.fmcsa.dot.gov/espa%C3%B1ol/english/pdfs/part_365.htm>.

Performance and Registration Information Systems Management (PRISM). n.d. Federal Motor Carrier Safety Administration. 20 Mar. 2006 <http://www.fmcsa.dot.gov/facts-research/facts-figures/analysis-statistics/prism.htm>.

Personal Identification - AAMVA International Specification - DL/ID Card Design. Mar. 2005. American Association of Motor Vehicle Administrators. 17 Mar. 2006 <http://www.aamva.org/Documents/std2005DL-IDCardSpecV2FINAL.pdf>.

Pfefer, R.C., T.R. Neuman, and R.A. Raub. Improved Safety Information to Support Highway Design (NCHRP Report 430). 1999. Transportation Research Board. 20 Mar. 2006 <http://www4.trb.org/trb/crp.nsf/All+Projects/NCHRP+17-12>.

Pfefer, R.C., R.A. Raub, and R.E. Lucke. Highway Safety Data: Costs, Quality, and Strategies for Improvement, Final Report (FHWA-RD-96-192). Jan. 1988. Federal Highway Administration. 20 Mar. 2006 <http://ntl.bts.gov/lib/6000/6700/6773/673.pdf>.

Policy on Manufacturers Certificate of Origin (MCO). 2002. American Association of Motor Vehicle Administrators. 20 Mar. 2006 <http://www.aamva.org/Documents/nws2002PolicyBookAppendices.pdf#page=11>.

Policy on Vehicle Titling/Certificate of Origin. 2002. American Association of Motor Vehicle Administrators. 20 Mar. 2006 <http://www.aamva.org/Documents/nws2002PolicyBookAppendices.pdf>.

Redding, R.L. Federal Government Reviews Anti-Car Theft Act. Nov. 1999. Automotive Service Association. 20 Mar. 2006 <http://www.asashop.org/autoinc/nov99/legis.htm>.

Registration Reciprocity Agreement between the Signatory Jurisdictions. n.d. American Association of Motor Vehicle Administrators. 17 Mar. 2006 <http://www.aamva.org/Documents/mcs_AAMVARegistrationReciprocityAgreement.pdf>.

Research Project #9: Explore Options for Using Technology in Data Collection. Safety Data Action Plan. n.d. Bureau of Transportation Statistics. 17 Mar. 2006 <http://www.bts.gov/publications/safety_data_action_plan/project_09.htm>.

SafetyAnalyst. n.d. Federal Highway Administration. 20 Mar. 2006 <http://www.safetyanalyst.org/>.

Safety and Fitness Electronic Records System. n.d. Federal Motor Carrier Safety Administration. 20 Mar. 2006 <http://safer.fmcsa.dot.gov>.

"Safety in Numbers: Using Statistics to Make the Transportation System Safer." Safety Data Action Plan. 13 Sep. 2000. Bureau of Transportation Statistics. 17 Mar. 2006 <http://www.bts.gov/publications/safety_data_action_plan/entire.pdf>.

"Safety Management Systems: Good Practices for Development and Implementation." Safety by Design. 20 May 1996. Federal Highway Administration. 17 March 2006 <http://safety.fhwa.dot.gov/state_program/safety_manage/docs/sm_best.pdf>.

Scopatz, R.A., C.E. Hatch, B.H. DeLucia, K.A. Tays. Unlicensed to Kill: The Sequel. Jan. 2003. AAA Foundation for Traffic Safety. 20 Mar. 2006 <http://www.aaafoundation.org/pdf/UnlicensedToKill2.pdf>.

Social Security Online Verification (SSOLV). 25 Jun. 2002. American Association of Motor Vehicle Administrators. 17 Mar. 2006 <http://www.aamva.org/drivers/drv_AutomatedSystemsSSOLV.asp>.

State CMV "Cab Card" Samples. 19 Feb. 2004. American Association of Motor Vehicle Administrators. 20 Mar. 2006 <http://www.aamva.org/irp/jurisinfo/jur_CabCards.asp>.

State Data System Crash Data Report: 1990 – 1999. Jul. 2002. National Highway Traffic Safety Administration. 17 Mar. 2006 <http://www-nrd.nhtsa.dot.gov/pdf/nrd-30/NCSA/Rpts/2002/809_301/809_301.pdf>.

State Laws Regarding Proof of Financial Responsibility. n.d. Insurance Information Institute. 20 Mar. 2006 <http://www.iii.org/individuals/auto/a/stateautolaws>.

State Legislative Fact Sheet. n.d. National Highway Traffic Safety Administration. 20 Mar. 2006 <http://www.nhtsa.dot.gov/people/outreach/safesobr/13qp/facts/factzero.html>

Strategic Highway Safety Plans: A Champion's Guide to Saving Lives. 14 Oct. 2005. Federal Highway Administration. 13 Dec. 2005 <http://safety.fhwa.dot.gov/safetealu/shsppreview.htm>

Taking a Bite Out of Crime. Station Reporter Online. 20 Mar. 2006 <http://home.istar.ca/~rdalfers/STORY1H.html>.

TIRF DWI System Improvements. n.d. Traffic Injury Research Foundation. 20 Mar. 2006 <http://www.trafficinjuryresearch.com/dwi_systemimprovements/workgroup_systemimprovements.cfm>.

Traffic Records: A Highway Safety Program Advisory. Dec. 2004. National Highway Traffic Safety Administration. 20 Mar. 2006 <http://www.nhtsa-tsis.net/trd/pdfs/AdvisoryJune12003Version.pdf>.

Traffic Safety Information Systems in Europe and Australia. Oct. 2004. Federal Highway Administration. 17 Mar. 2006 <http://international.fhwa.dot.gov/tsis_04010/2004TSISReportWeb.pdf>.

Trauma System Agenda for the Future. Oct. 2002. National Highway Traffic Safety Administration. 17 Mar. 2006 <http://www.nhtsa.dot.gov/people/injury/ems/TRAUMA_SYSTEM/index.htm>.

Vehicle Manufacturer Information. n.d. National Highway Traffic Safety Administration. 20 Mar. 2006 <http://www.nhtsa.gov/portal/site/nhtsa/menuitem.2c1aef50b138a23d76c1f41046108a0c>.

Vehicle Registration Reciprocity Agreement. n.d. American Association of Motor Vehicle Administrators. 20 Mar. 2006 <http://www.aamva.org/Documents/mcs_AAMVARegistrationReciprocityAgreement.pdf>.

Vehicle (Title) Brands Best Practices. Sep. 2002. American Association of Motor Vehicle Administrators. 20 Mar. 2006 <http://www.aamva.org/Documents/vehBrandingBestPractices.pdf>.

Vehicle Types. 14 Oct. 2003. Federal Highway Administration. 20 Mar. 2006 <http://www.fhwa.dot.gov/policy/ohpi/vehclass.htm>.

Walton, C.M. and B.L. Mallory, et al. Strategic Highway Research Program (Special Report 260). 2001. Transportation Research Board. 17 Mar. 2006 <http://trb.org/trb/publications/sr/sr260.pdf>.

Wilson, E., and M.E. Lipinski. Road Safety Audits (NCHRP Synthesis 336). 2004. Transportation Research Board. 17 Mar. 2006 <http://trb.org/publications/nchrp/nchrp_syn_336.pdf>.

Working Group on DWI System Improvements. n.d. Traffic Injury Research Foundation. 17 Mar. 2006 <http://www.tirf.org>.

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APPENDIX C. Abbreviations and Acronyms

AAAM	Association for the Advancement of Automotive Medicine
AAMVA	American Association of Motor Vehicle Administrators
AASHTO	American Association of State Highway and Transportation Officials
ACS	American College of Surgeons
AIS	Abbreviated Injury Score
ANSI	American National Standards Institute
ATSIP	Association of Transportation Safety Information Professionals
BAC	Blood Alcohol Concentration
BPEVR	Business Partner Electronic Vehicle Registration
CDC	Center for Disease Control
CDLIS	Commercial Driver License Information System
CODES	Crash Outcome Data Evaluation System
DMV	Department of Motor Vehicles
DOT	Department of Transportation
DUI	Driving Under the Influence
ED	Emergency Department
EMS	Emergency Medical Service
FARS	Fatality Analysis Reporting System
FHWA	Federal Highway Administration
GES	General Estimates System
GIS	Geographic Information System
GJXDM	Global Justice XML Data Model
GPS	Global Positioning System
HPMS	Highway Performance Monitoring System
ICD	Injury Coding System
IRP	International Registration Plan
ISS	Injury Surveillance Score
LEIN	Law Enforcement Information Network
MCMIS	Motor Carrier Management Information System

MMUCC	Model Minimum Uniform Crash Criteria
NCIC	National Crime Information Center
NCSC	National Center for State Courts
NDR	National Driver Registry
NEMSIS	National Emergency Medical Service Information System
NGA	National Governor's Association
NHTSA	National Highway Traffic Safety Administration
NIBRS	National Incident-Based Reporting System
NLETS	National Law Enforcement Telecommunication System
NMVTIS	National Motor Vehicle Title Information System
PDPS	Problem Driver Pointer System
RTS	Revised Trauma Score
SHSP	Strategic Highway Safety Plan
SWISS	Statewide Injury Surveillance System
TCD	Traffic Control Devices
TRCC	Traffic Records Coordinating Committee
TRS	Traffic Records System
UCR	Uniform Crime Reporting
VIN	Vehicle Identification Number
VMT	Vehicle Miles Traveled